

Monuments at Risk?

Mapping threats to heritage assets on the Malvern Hills: The British Camp Hillfort Survey



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Abstract

The aim of this project was to record and categorise the potential threats to British Camp Hillfort, focusing specifically on damage caused by intrusive vegetation, rabbits and foot and bicycle traffic. This was achieved through fieldwork and the use of Trimble GeoXT GPS system. The results were mapped using ArcGIS 10.2.1.

The results showed that whilst significant parts of the hillfort are in good condition, there are areas of concentrated damage and erosion across specific parts of the monument which may threaten earthworks and subsurface archaeology. The accurate mapping of these areas means there is a body of data that can be used as a baseline against which to evaluate the condition of the hillfort in the future.

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Key Abbreviations

AONB	Area of Outstanding Natural Beauty
CMP	Conservation Management Plan
GPS	Geographical Positioning System
HER	Historic Environment Record
HSM	Herefordshire Sites and Monuments
MHC	Malvern Hills Conservators
SM	Scheduled Monument
SSSI	Site of Special Scientific Interest

1.0 Introduction

Herefordshire Beacon (British Camp) is an Iron Age hillfort found in the Malvern Hills and is one of the most nationally important, complex and distinctive topographical sites of this type in Britain. It is one of two that dominate the area, the other being Midsummer Hill, Eastnor. Both are located on the ridge of the Malvern Hills. The site is protected as a Scheduled Monument (SM) as well as being in an Area of Outstanding Natural Beauty (AONB) and a part of the wider Site of Special Scientific Interest (SSSI) of the Malvern Hills. Such designation facilitates the conservation of the site through plans and actions by the relevant statutory (or other) bodies.

The hillfort is popular for recreation with both tourists and locals and in addition, burrowing animals such as rabbits are prevalent. As a result, parts of the hillfort suffer from extensive erosion from rabbits and foot/bike traffic and there are also issues relating to intrusive vegetation. This research, which forms part of a larger project *Memorialisation and Commemoration on the Malvern Hills* initiated in 2013 by Dr Jodie Lewis, aims to record and map this erosion through field observation and the use of differential GPS systems. This work follows the publication of a Conservation Management Plan (CMP), prepared as part of a Higher Level Stewardship Agreement under Natural England's Environmental Stewardship Scheme in partnership with the Malvern Hills Area of Outstanding Natural Beauty for Herefordshire Council, and it is hoped that it can be used in conjunction to aid the future management of the site.

This project was funded by the University of Worcester *Earn as You Learn Students as Researchers* scheme.

2.0 Understanding the Asset

2.1 Location and Access

British Camp, comprising Herefordshire Beacon and Millennium Hill, forms part of the main ridge of the Malvern Hills, a landscape which spans 12.5 kilometres bordering the western edge of the Severn Valley (figure 1). The site straddles the county boundary between Herefordshire and Worcestershire, however it mainly resides within the parish of Colwall in Herefordshire.

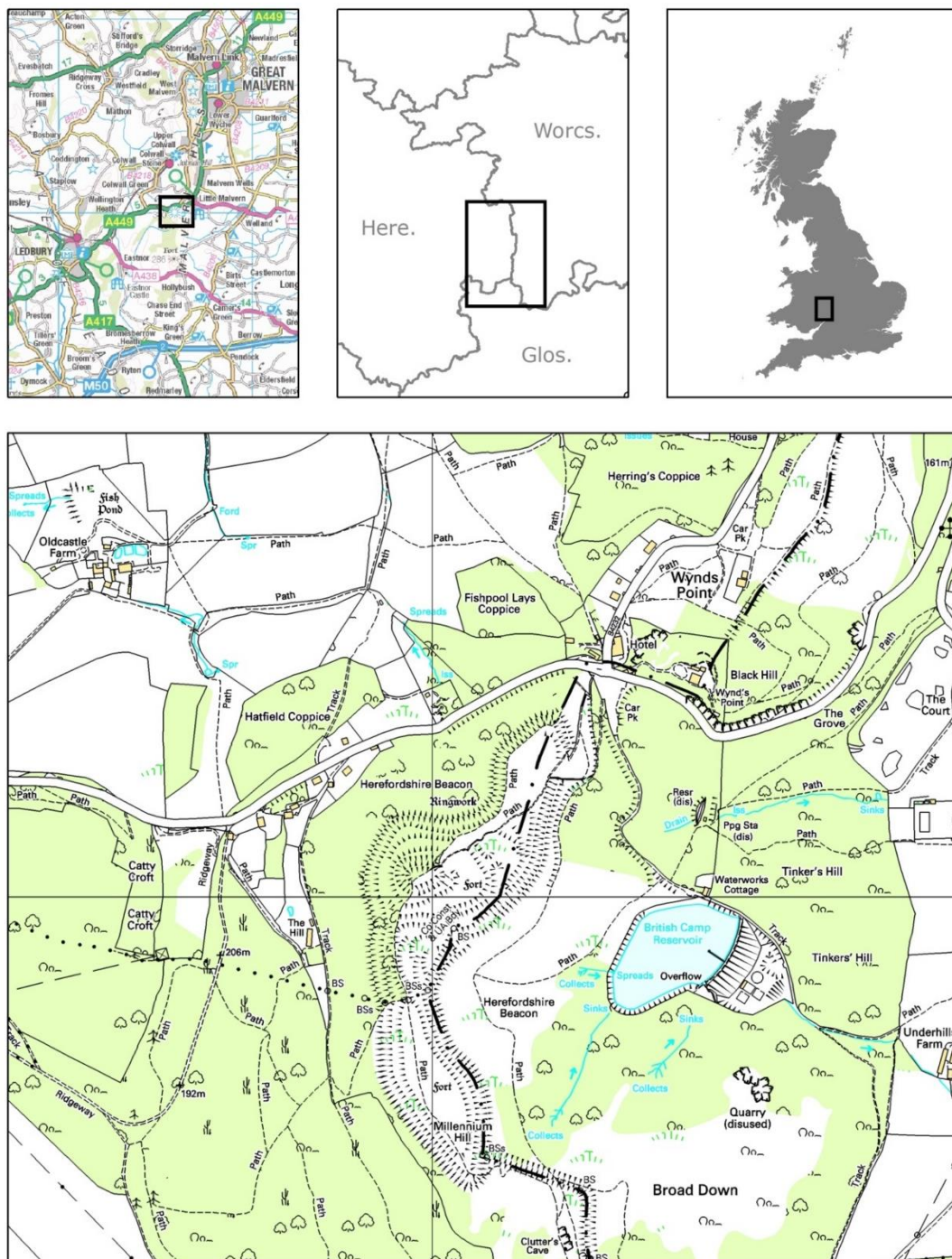


Figure 1: Location of Herefordshire Beacon (British Camp)
(© Crown copyright supplied by Edina Digimap 2014)

British Camp covers approximately 19.3 hectares and the altitude of the site ranges from 265m to 338m OD. The highest summit is the citadel at 338m OD.

The soil of the site is mainly freely draining acid loamy soil over rock which is found across 2.6% of England (Soilscapes 2014).

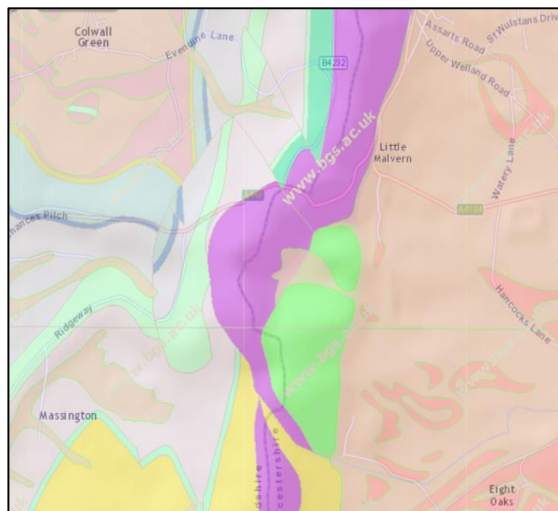


Figure 3. Map of site geology (British Geological Survey 2014)

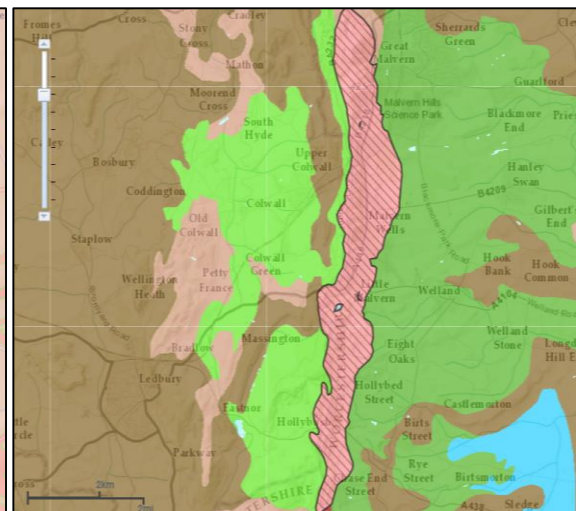


Figure 3. Map of site soil parent material (Soilscapes 2014)

2.3 Archaeology

The study area consists of three main archaeological features: the Iron Age hillfort, the medieval ringwork (the "Citadel"), and the Shire Ditch.

British Camp is one of five hillforts situated along the Malvern Hills, incorporating Herefordshire Beacon and extending towards Millennium Hill (Bowden 2005). Evidence is apparent for three defined periods of major construction; the first two during the Iron Age with the creation of the hill fort, and the third known as the 'Citadel' from the medieval period.



Figure 4: View of Herefordshire Beacon/British Camp Hill Fort (Malvern Hills AONB 2015)

The Citadel (or Herefordshire Beacon Ringwork) dates to the medieval period and consists of a ringwork and bailey, with possible signs of a stone gateway on the bailey. The central enclosure is a ring motte, presumably of 12th century date (Herefordshire Through Time 2010). The ringwork itself has an interior platform surrounded by a rampart and is morphologically of medieval date (Bowden 2005), and appears to range from the 11th century to the 14th century. The ringwork can be seen as the uppermost earthwork in figure 4.

The Shire Ditch (Scheduled Ancient Monument 244) is a linear boundary that runs along most of the principal ridge of the Malvern Hills (figure 5). Due to its relationship with Midsummer Hill, it is thought by some that its origin may be prehistoric, and Hooke's work (1985; 1990), cited by Bowden (2005) suggests that it was a significant feature in the landscape in the Anglo-Saxon period.

Since the 10th century AD, the Shire Ditch has functioned as an estate boundary as well as the diocesan boundary between Hereford and Worcester. The Shire Ditch's relationship with British Camp shows that here at least it post-dates the hillfort (Bowden 2005; Herefordshire Through Time 2010).



Figure 5: The Shire Ditch (Malvern Hills Conservators 2010)

The statutory designations for the site are:

- Scheduled Ancient Monument number: 113786
- Worcestershire Sites and Monuments number: WSM00932
- Herefordshire Sites and Monuments number: 932
- Site of Special Scientific Interest (SSSI): The Malvern Hills
- Area of Outstanding Natural Beauty: Malvern Hills
- National Character Area (NCA) number 103: Malvern Hills

2.4 Ownership/management responsibilities

The responsibility and ownership of Herefordshire Beacon lies with the Malvern Hills Conservators (MHC). Other key partners or interest organisations of the MHC include: the Malvern Hills AONB Partnership, English Heritage, Natural England, Southern Hills Grazier and Herefordshire Archaeology.

The management of the site comes from a collaboration of plans and actions from all of these statutory and non-statutory bodies.

3.0 Aim & Objectives

3.1 Aim

The aim of this project was to record and map the threats (e.g. rabbits, intrusive vegetation, sledging, foot and bicycle traffic) to British Camp Iron Age Hillfort to sub-metre accuracy in the hope of aiding and building upon the conservation management plan of the hillfort prepared by Herefordshire Council. This project will also seek to understand the wider implications of the erosion to Herefordshire Beacon.

The rationale for undertaking this project was also to enable this data, collected at a specific point in time, to be used as a baseline to evaluate the future condition against. Indeed, Dorling (2013) proposed that monitoring should be ongoing.

3.2 Objectives

- Categorise types of damage/erosion
- Collect data in the field using differential GPS.
- Download and collate results on ArcGIS 10.2.1.
- Analyse and contextualise the results

4.0 Methodology

The fieldwork for this project was undertaken in wet / foggy to moderate conditions by four people between the 23rd and 28th May 2014.

The study area was defined by the outer ramparts of the British Camp hillfort, with a buffer of 25 metres extending outwards: the area covers approximately 19.7 hectares. This buffer was implemented in the ArcGIS software onto the English Heritage plan of the monument.

A pro-forma database schema of the types of erosion to be recorded was created and the data collected using a Trimble GeoXT GPS to sub-metre accuracy (Table 1). The terms used, which were identified from the CMP, included rabbit areas (both scattered and concentrated), rabbit holes, vegetation areas, erosion areas or lines, tree points and generic points or areas of other data that was felt to be significant.

Table 1. *Range of accuracy for GPS data*

Range	Percentage
0-15cm	-
15-30cm	-
30-50cm	21.2%
0.5-1m	76.4%
1-2m	2.4%
2-5m	0.1%
>5m	-

The data was collected systematically, working from the lower ramparts upwards and starting from the northern plateau and heading south towards Millennium Hill (figure 1). Where possible, the erosion was mapped out as polygons, to denote areas, and points, for isolated features. Lines were used to mark the top and/or bottom of erosion areas when mapping the entire perimeter of the area became impractical, for example when vegetation was too thick or ramparts too steep to allow access. Aerial imagery was then used alongside this to mark the full extent of the erosion during mapping. Using ArcGIS 10.2.1, the data was overlaid onto base mapping, including Bowden's metrical survey (2005) and Google Earth imagery, to illustrate the extent of the damage.

5.0 Results

Figure 6 below represents the proportion of threats/damage to British Camp hillfort recorded and mapped during this study.

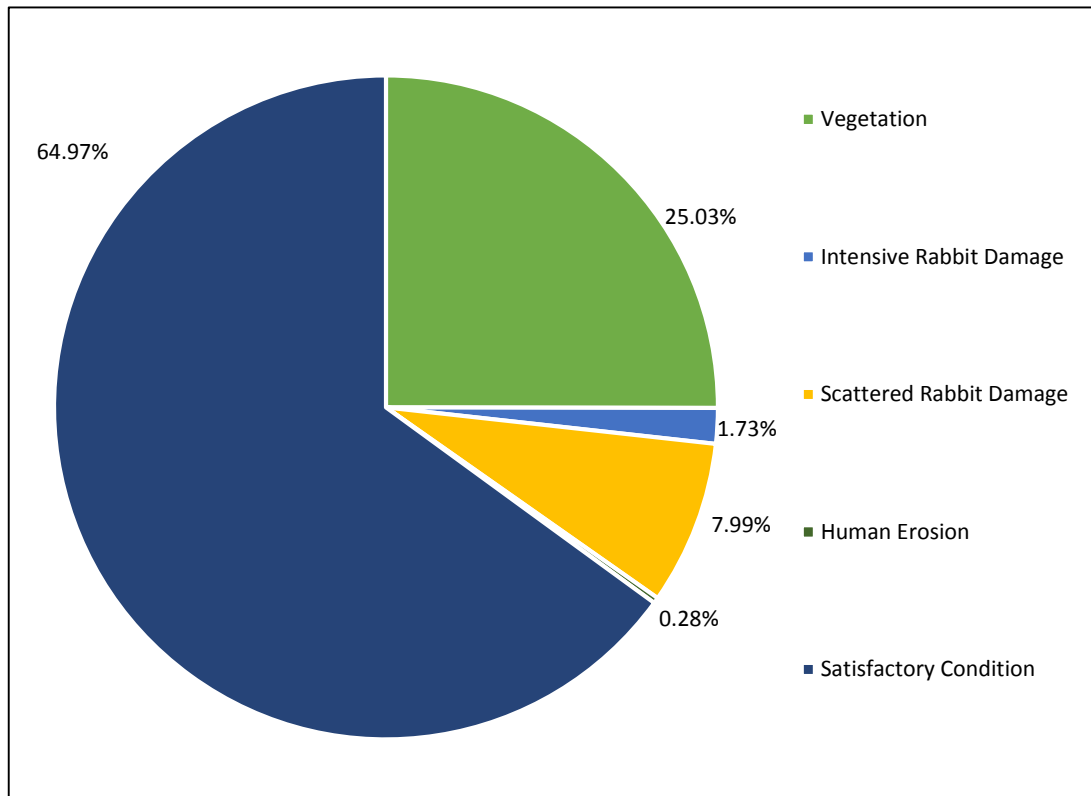


Figure 6: Proportion of threats by total area of hillfort

Almost 65% of the monument is deemed to be in satisfactory condition. Vegetation accounts for the largest proportion of threats, covering 25% of the monument, predominantly on the lower ramparts. Significant erosion caused by rabbit activity affects almost 10% of the study area. Anthropogenic damage is minimal in comparison to these two categories but many of the threats overlap and are exacerbated by each other.

The following section provides detailed maps of the GPS survey results, as defined in the methodology. Each threat is mapped individually, as well as composite figures for rabbit damage and vegetation. A final composite map showing all areas of damage and threat to the monument is also included. Figure 31 in the appendix is a Google Earth image of the study area which also clearly shows the different vegetation and erosion.

Figure 7 is taken from Dorling's 2013 report and is a summary of vegetation and erosion management issues. This will be used for comparison with the final composite map produced for this study.

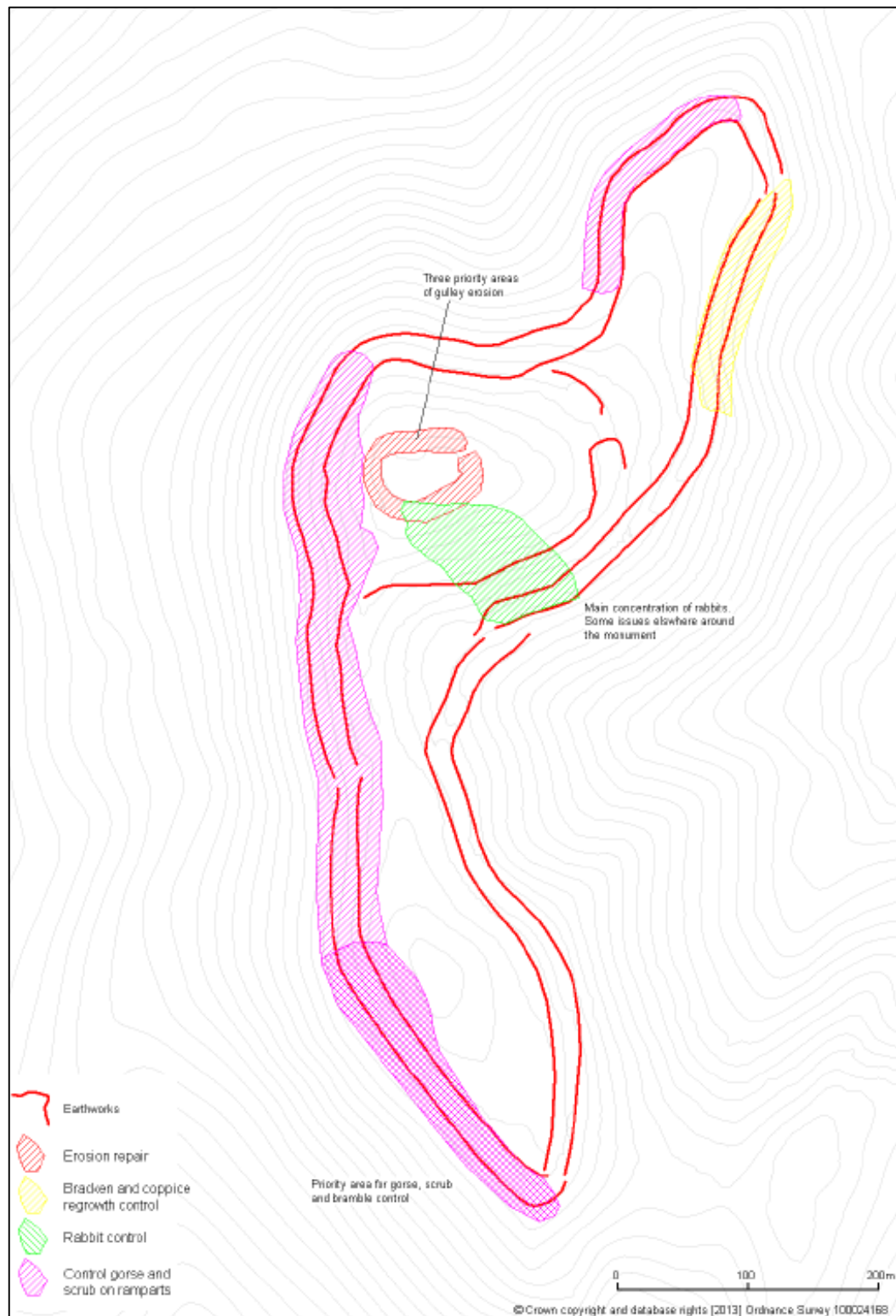


Figure 7: Summary of vegetation and erosion management issues in Herefordshire Council CMP (Dorling 2013, 53)

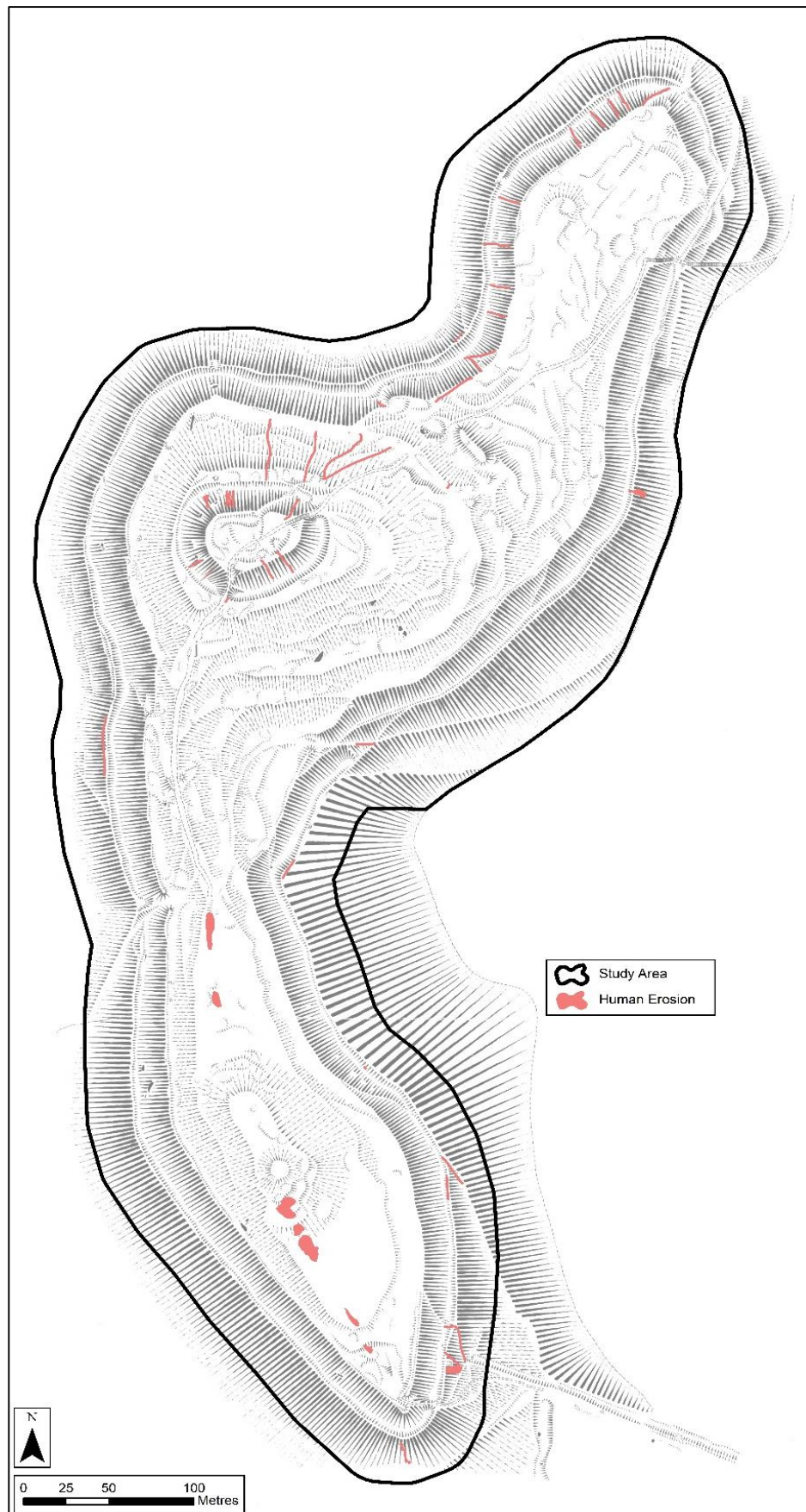


Figure 8: Areas of Human Erosion. Metric survey copyright Bowden 2005.

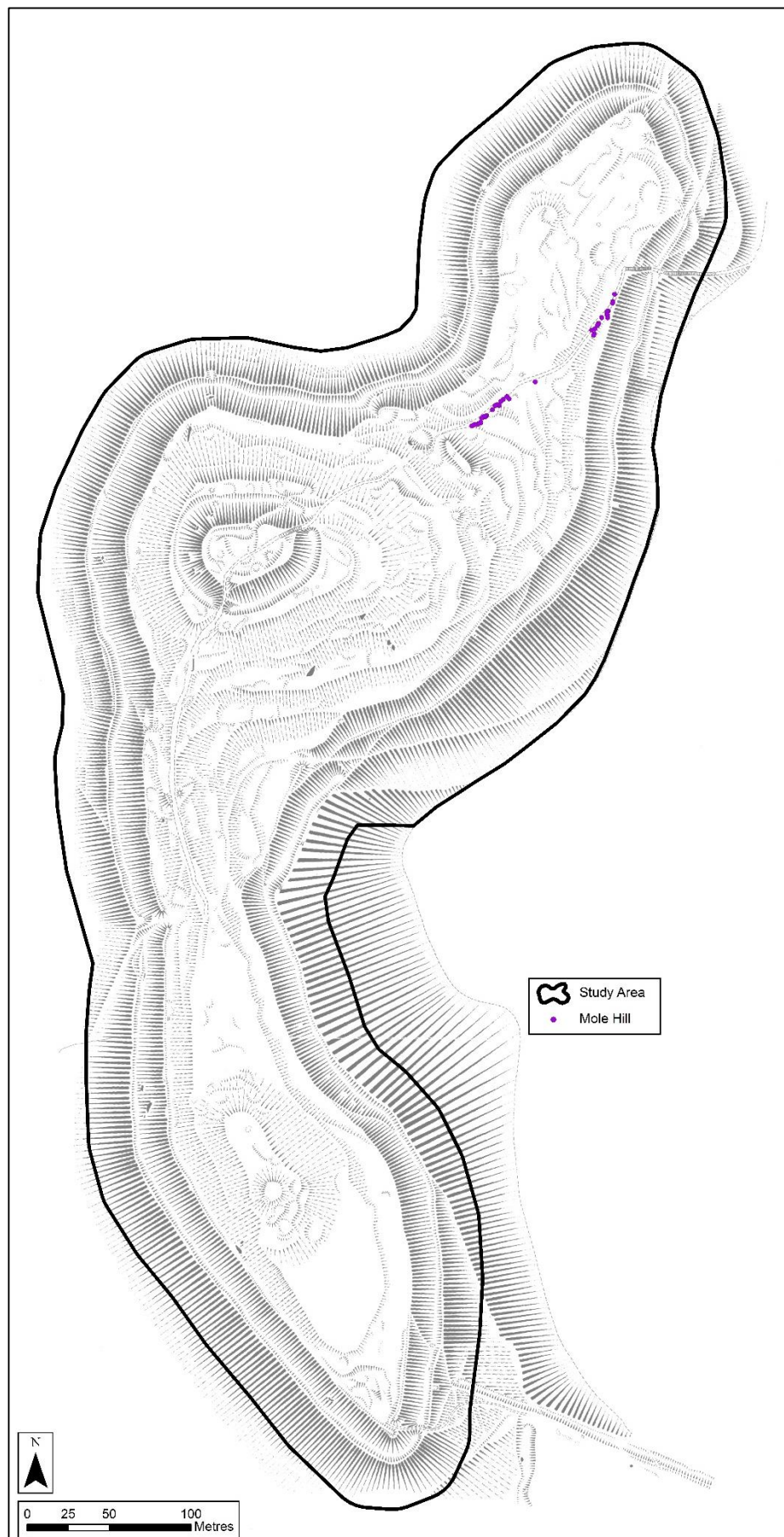


Figure 9: Survey Results of Molehills

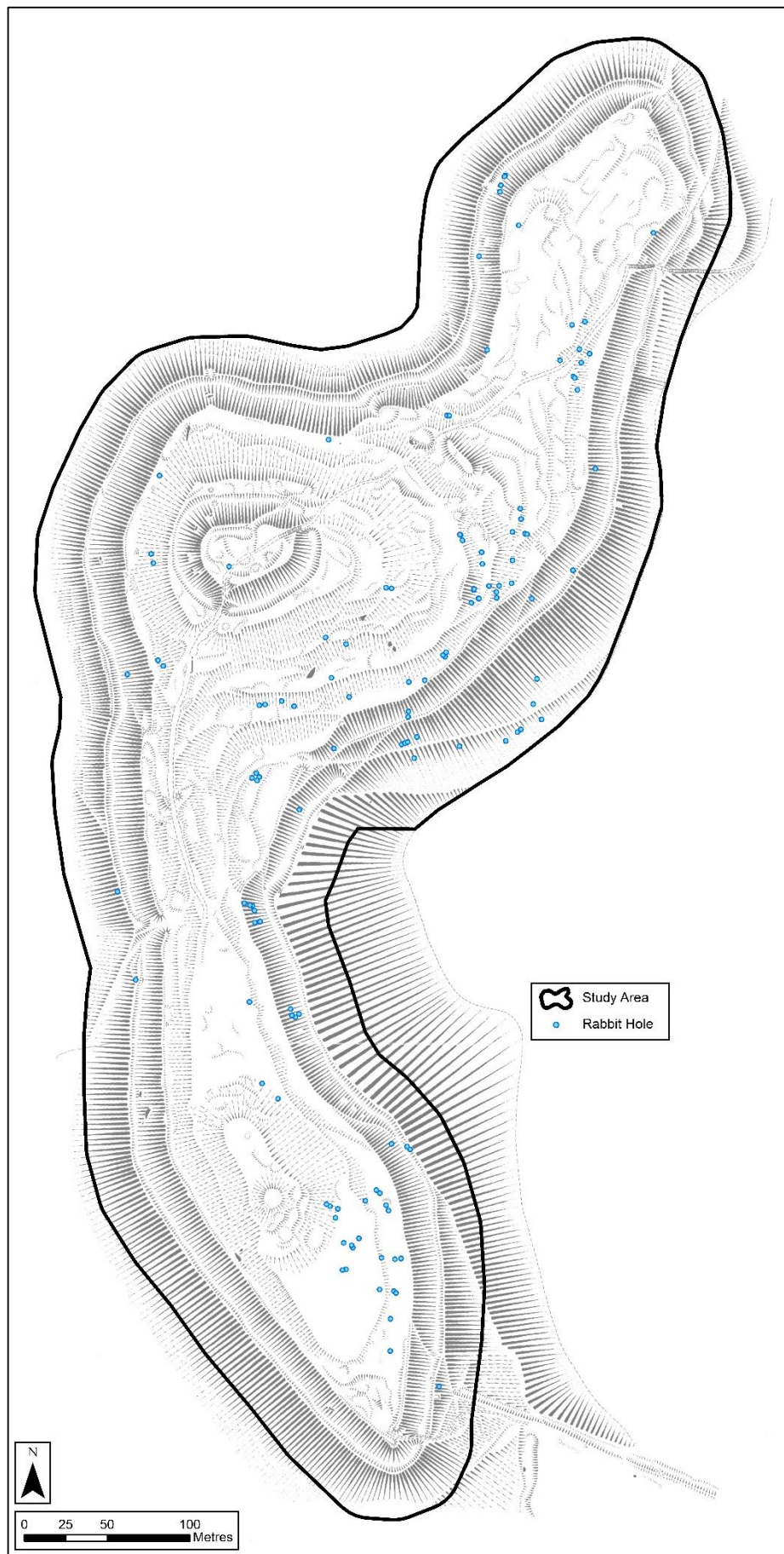


Figure 10: Survey Results of Rabbit Holes

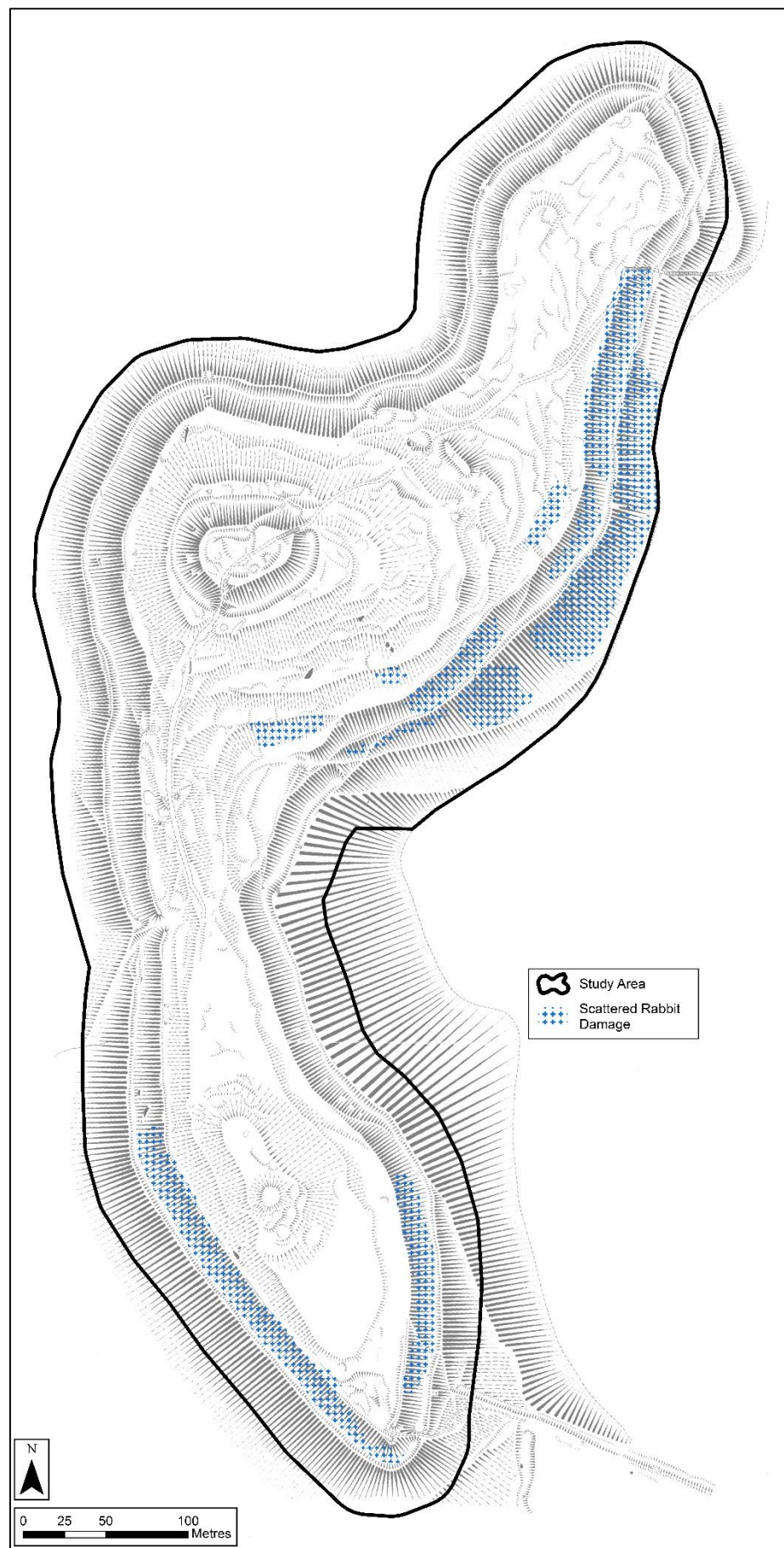


Figure 11: Survey Results of Scattered Rabbit Damage

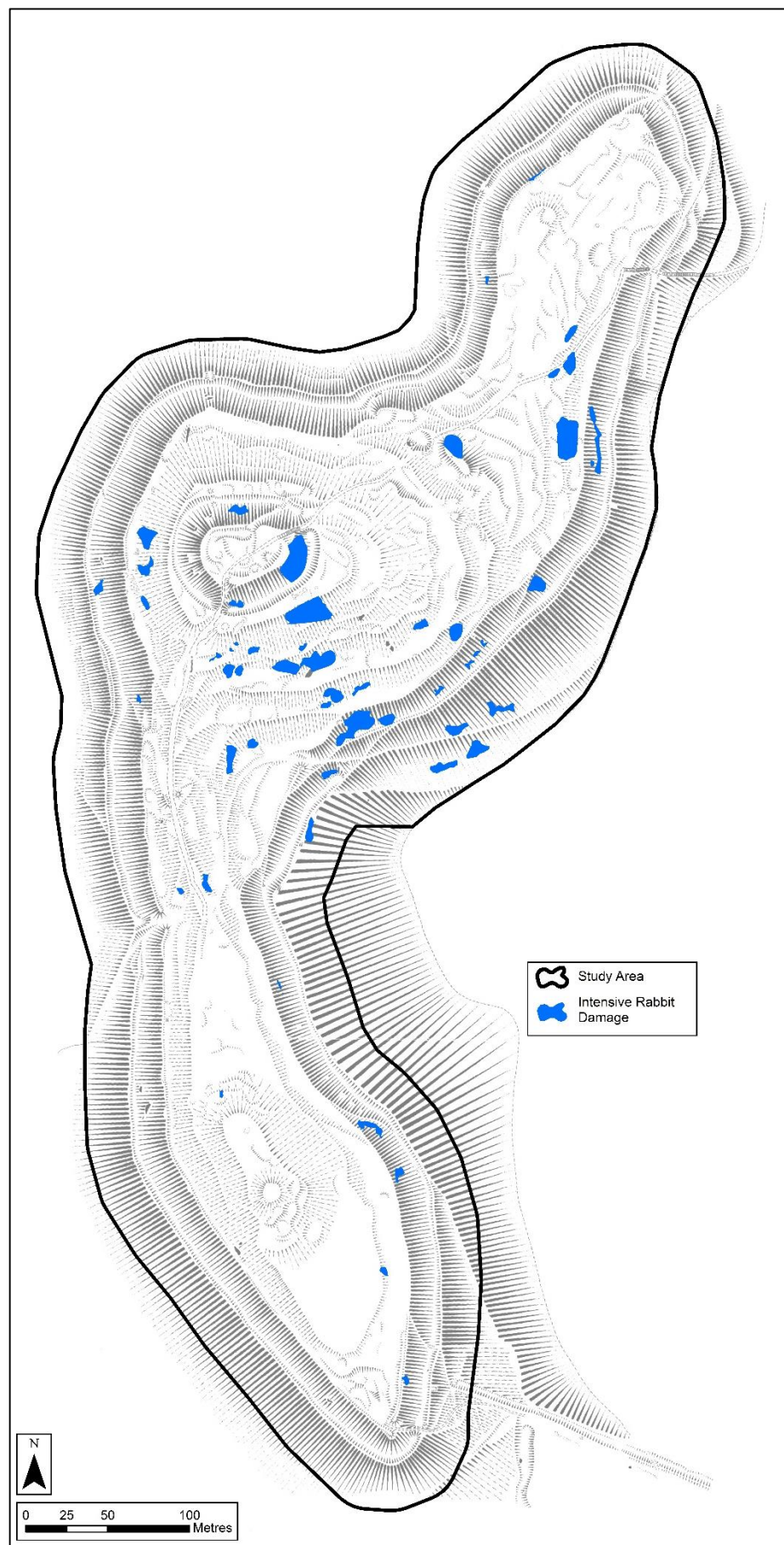


Figure 12: Survey Results of Intensive Rabbit Damage

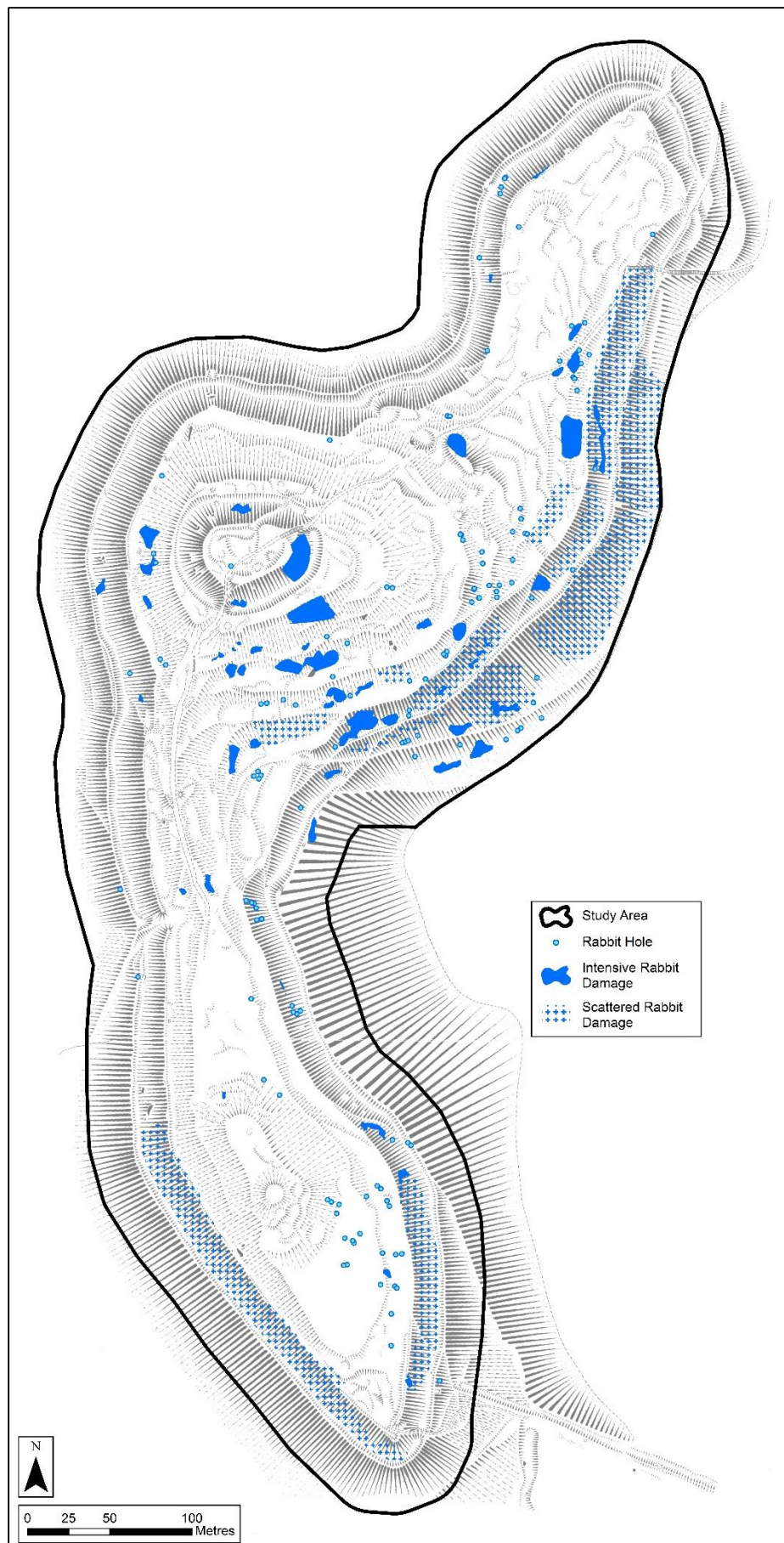


Figure 13: Combined rabbit holes, scattered and intensive rabbit damage

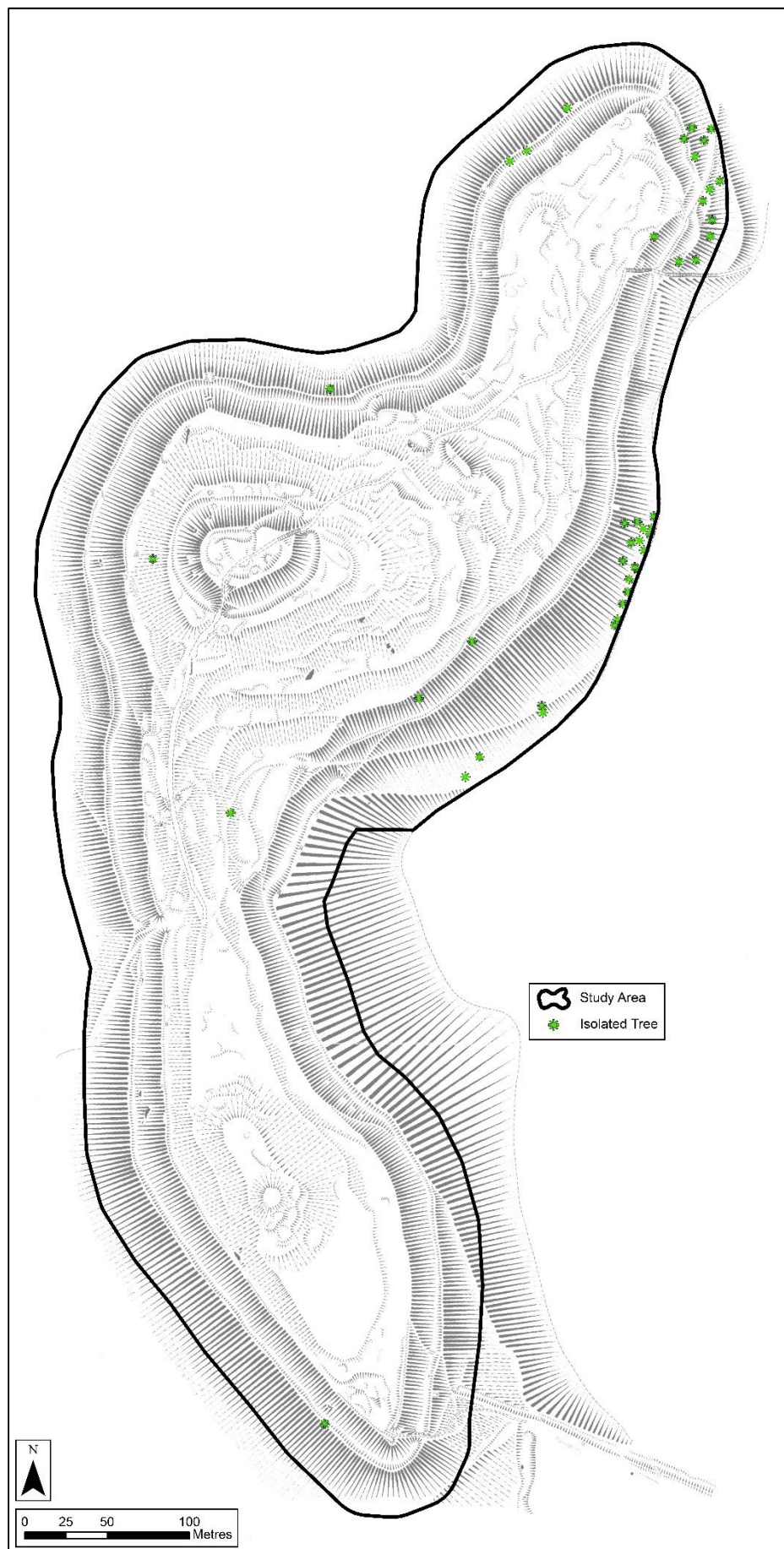


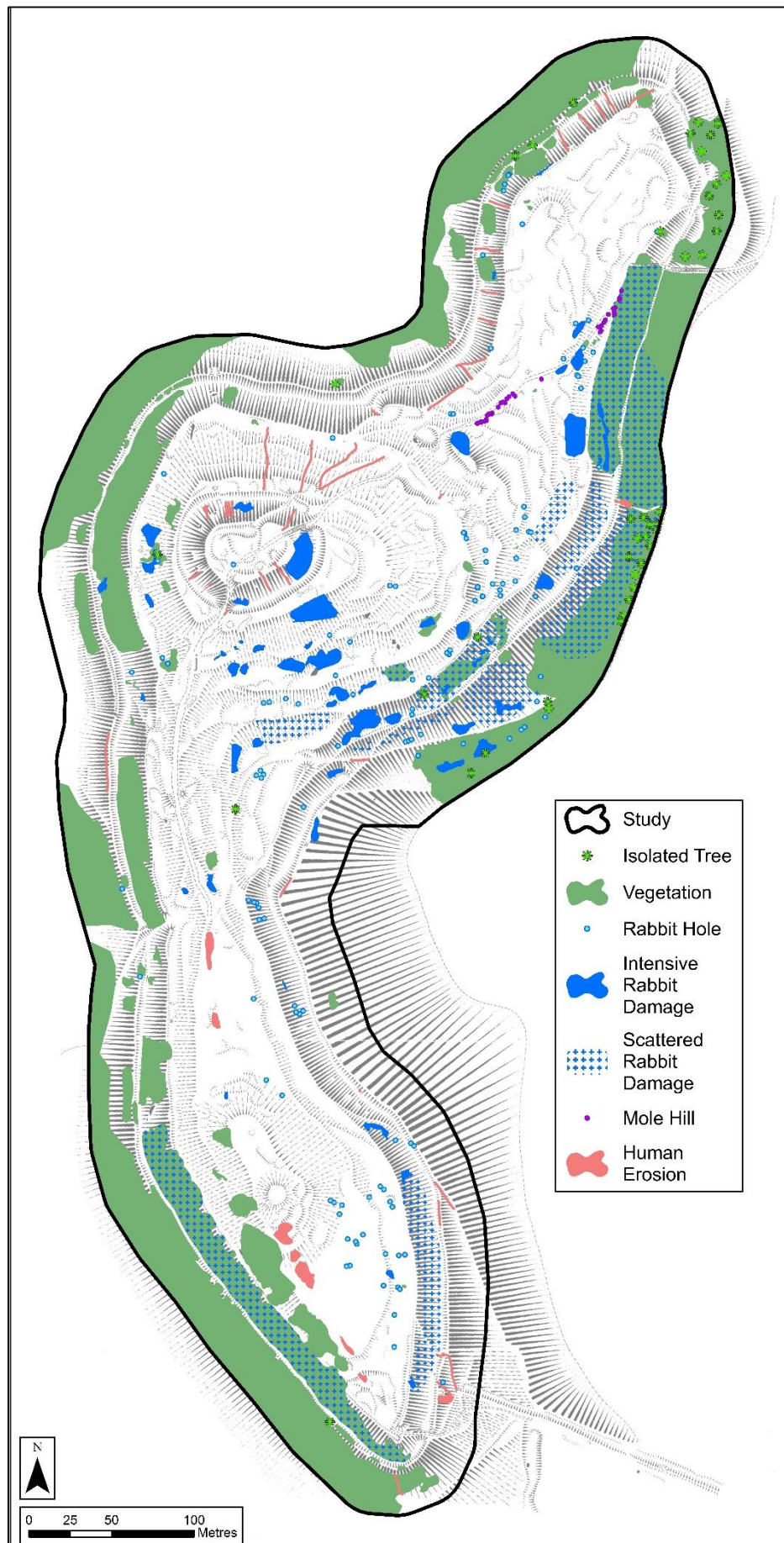
Figure 14: Locations of Isolated Trees



Figure 15: Total Vegetation Cover excluding Isolated Trees



Figure 16: Total vegetation cover including isolated trees

**Figure 17: Total recorded threats and erosion**

6.0 Discussion

The maps in the results section show the data recorded in the GPS survey, as outlined in the methodology. The main categories recorded are:

- Human Erosion
- Rabbit Damage (rabbit holes, scattered damage & intrusive damage)
- Mole Hills
- Vegetation (including isolated trees)

Human Erosion

The Malvern Hills are an area popular for recreation and the improvement of paths to the summit of Herefordshire Beacon has made the site more accessible. Erosion as a result of foot and bicycle traffic (as well as other recreational activities such as sledging in the winter) is apparent in all parts of the study area.

The results of the GPS survey clearly identify the main areas of damage as a result of human erosion (figure 8) as concentrated around the lower ramparts of the monument.



Figure 18: Visible erosion along footpath

Humans cause wear to the surface of the ground, but do not necessarily cause significant damage to the archaeological integrity of the monument (Rimmington 2004). The entrenching of paths and routes through continued use, however, does

lead to significant damage and erosion of archaeological deposits as well as alterations to the profiles and setting of the earthworks (figures 18-20).



Figure 19: Footpath along rampart looking towards British Camp

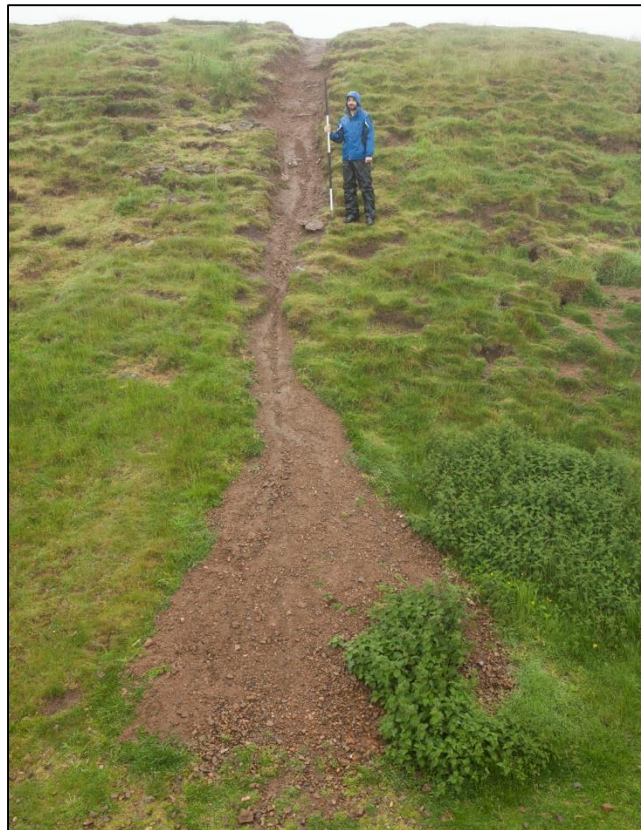


Figure 20: Damage to upper rampart through human erosion in the form of gulleys

Significant erosion caused by human activity has also been recorded along the path between Millennium Hill and Herefordshire Beacon, and at the south-eastern end and the summit of Millennium Hill (figure 8).

Rabbit Damage

Rabbit burrows are concentrated on the eastern side of the monument (figure 10), and scattered rabbit damage is also most evident on the eastern side (figure 11). Intensive rabbit damage, such as shown in the top right and bottom left photographs in figure 21, is most obvious on the summit and eastern side of Herefordshire Beacon on the slopes of the ramparts (figure 12). Dorling highlighted one main area of rabbit damage on the south-eastern side of Herefordshire Beacon and also indicated that there were other less significant areas of damage across the rest of the monument. It would appear when comparing figures 7 and 13 that more damage has been caused as a result of rabbit activity, especially to the north-east of the monument.

Scattered rabbit damage is defined as individual burrows close, but not necessarily immediately adjacent to others, whereas intensive rabbit damage was where large areas of erosion were apparent due to a concentrated rabbit population.

Rabbit damage is worsened by foot or bike traffic which exacerbates erosion - areas such as the Citadel clearly show this (figure 17).



Figure 21: Array of areas of rabbit damage on various parts of the monument

Efforts to control the rabbit population took place prior to 1998 through the utilisation of ferrets and blocking of rabbit holes (Alma 1998), and again in 2013/14 (Dorling 2013).

Mole hills

Figure 9 illustrates the areas of molehills recorded, and it is apparent that the majority of resultant damage from this category is to the north east of the ringwork of British Camp. The molehills appear to run parallel to the main footpath from the car park (figure 22).



Figure 22: Evidence of mole activity along path

The burrowing animals on British Camp have the potential to destabilise the earthworks leading to exposure of the soil and further degradation from influences such as the wind and the rain (Rimmington 2004). Evidence from other monuments would suggest the earthworks on British Camp, which have a slope greater than 20%, are particularly susceptible to this type of erosion.

Erosion from burrowing animals may thus result in the loss of archaeological evidence in the form of both upstanding and buried remain. Rimmington (ibid) also details how the tunnelling activities of these animals can destroy stratigraphy and result in the redistribution of artefacts and the ultimate loss of information.

Vegetation

There is abundant vegetation across the whole of the monument, ranging from trees to bracken and gorse. Figure 16 illustrates all vegetation cover, including the isolated trees recorded during the survey, and the appendix includes maps of the different types of vegetation recorded during the GPS survey which comprises bracken, gorse, brambles, Rosebay Willowherb and trees.

There are small pockets of vegetation around the upper ramparts of Herefordshire Beacon and along Millennium Hill, but most vegetation is located around the periphery of the monument on the lower ramparts, specifically along the western edge and north-east. It is apparent that the vegetation is beginning to move upwards

A number of isolated trees were recorded within the study area, and these are mostly located on the lower reaches of the eastern side of the monument (figures 14 and 23). Figure 30 in the appendix highlights the areas of denser tree cover, which in comparison is on the western side and extends down over the slopes.



Figure 23: Isolated trees along eastern side of Herefordshire Beacon

Bracken is concentrated on the northern side of the monument, along the lower ramparts (figure 26). Certain species of vegetation, in particular bracken, are a source of cover for rabbits (Dorling 2013). The control of bracken may need to be undertaken to prevent the risk of further damage in the areas where vegetation and rabbit activity are present. Bracken itself can be damaging to the long-term preservation of archaeological sites and may have a detrimental effect on the survival of archaeological remains (Rimington 2004).

Bramble and gorse are two other forms of vegetation that are prevalent across the monument. Bramble is more concentrated around the western side along the lower ramparts, with small pockets on the eastern side (figures 24 & 27). Gorse is evident in almost exactly the same locations as bramble, but extends further up the slopes, and is more abundant on Millennium Hill than the bramble (figures 25 & 28).



Figure 24: Area of brambles on lower rampart on the west of the monument

Both bramble and gorse have the potential to affect the visibility of the monument, encourage rabbit activity and damage archaeology through root disturbance (Rimington 2004).



Figure 25: Area of gorse being recorded by students in May 2014

Rosebay Willowherb appears to be concentrated along the north-eastern side of the study area, with a small area to the north-west (figure 29). This type of plant is invasive, and like the other forms of vegetation in this report may cause damage to the integrity of the archaeological deposits within this area.

A survey carried out in 2013-14 by the Malvern Hills AONB showed that it was believed 100% of the scheduled monuments across the Malvern Hills were in 'satisfactory condition' (2014), and had improved from the 2008 trend of 63%. Based on the results of this report it is evident that the headline indicator of the AONB report may need revisiting, as only 65% of the monument was deemed to be in satisfactory (that is, "unthreatened") condition (figure 6).

The site has seen the reintroduction of grazing animals to combat scrub and this, along with hand cutting of vegetation, will need to be monitored to measure success (Dorling 2013).

7.0 Conclusion

This project accurately mapped and quantified the nature and scale of certain threats to British Camp Iron Age hillfort and provides a base for future assessment and monitoring. The results have expanded upon an initial assessment by Herefordshire Council and can be used to help inform future management and conservation decisions.

Further considerations for study might include the detailed mapping of the entrenchment of paths or routes caused by recreational pedestrian and cycle traffic, the spread of rosebay willowherb onto cleared areas, and assessment of the maturity of vegetation. The research undertaken for this study has also noted the emerging activity of moles which may become a future threat and may benefit from monitoring.

Bibliography

Alma, P.J. (1998) *The Ecology and Nature Conservation Value of the Land under the Control of the Malvern Hills Conservators*. Unpublished report derived from the Malvern Hills Conservators Management Plan Review.

Bowden, M. (2005) *The Malvern Hills: An ancient landscape*. London, English Heritage.

British Geological Survey (2014) *Geology of Britain Viewer*. [Online] Available From: <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html> [Accessed 28th May 2014]

Dorling, P. (14th October 2013) A Conservation Management Plan for Herefordshire Beacon ('British Camp'), Colwall, Herefordshire. *Herefordshire Council*.

Herefordshire Through Time (2010) *Herefordshire Beacon Camp, ringwork*. [Online] Available from: http://htt.herefordshire.gov.uk/smrSearch/Monuments/Monument_Item.aspx?ID=7155 [Accessed: 14th June 2015]

Malvern Hills AONB (2015) *Herefordshire Beacon*. [Online] Available from: <http://www.malvernhillsaonb.org.uk/about-the-aonb/image-gallery/> [Accessed: 14th June 2015]

Malvern Hills Conservators (2010) *The Shire Ditch*. [Online] Available from: http://www.malvern hills.org.uk/visiting/archaeology_of_the_hills.aspx [Accessed: 14th June 2015]

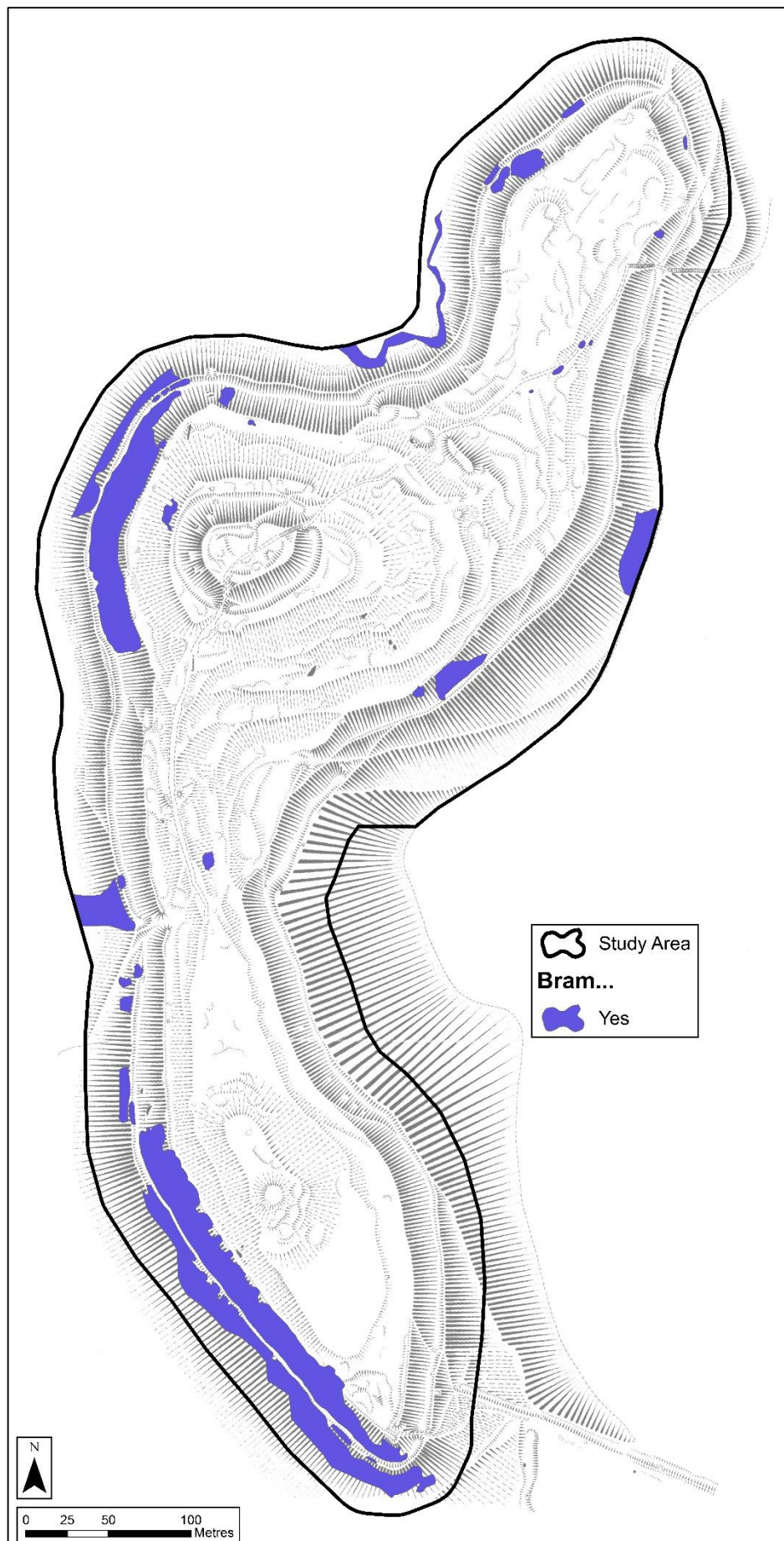
Malvern Hills Area of Outstanding Natural Beauty (2013) *Management Plan 2014-2019*. Worcestershire, Malvern Hills AONB Partnership.

Natural England (2012) *National Character Area profile: Malvern Hills 103*. [Online] Available From: <http://publications.naturalengland.org.uk/publication/3039205> [Accessed 28th May 2014]

Rimmington, J. N. (2004) *Managing Earthwork Monuments*.

Soilscapes (2014) *Soilscapes map*. [Online] Available From: <http://www.landis.org.uk/soilscapes> [Accessed 28th May 2014]

Appendix: Vegetation types across study area**Figure 26:** Areas of bracken cover

**Figure 27: Areas of brambles**

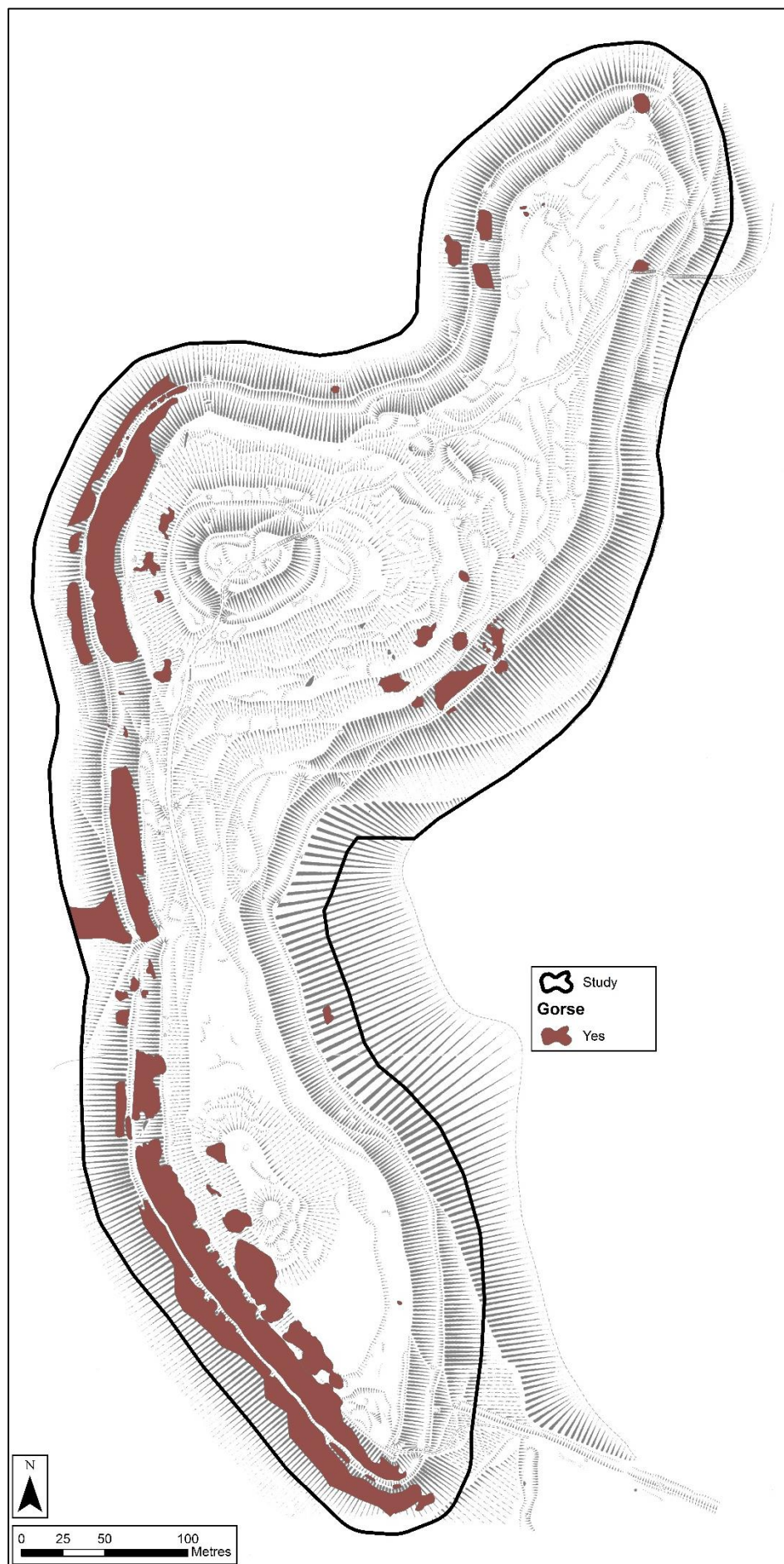
**Figure 28: Areas of gorse**



Figure 29: Areas of Rosebay Willowherb

**Figure 30: Tree cover**

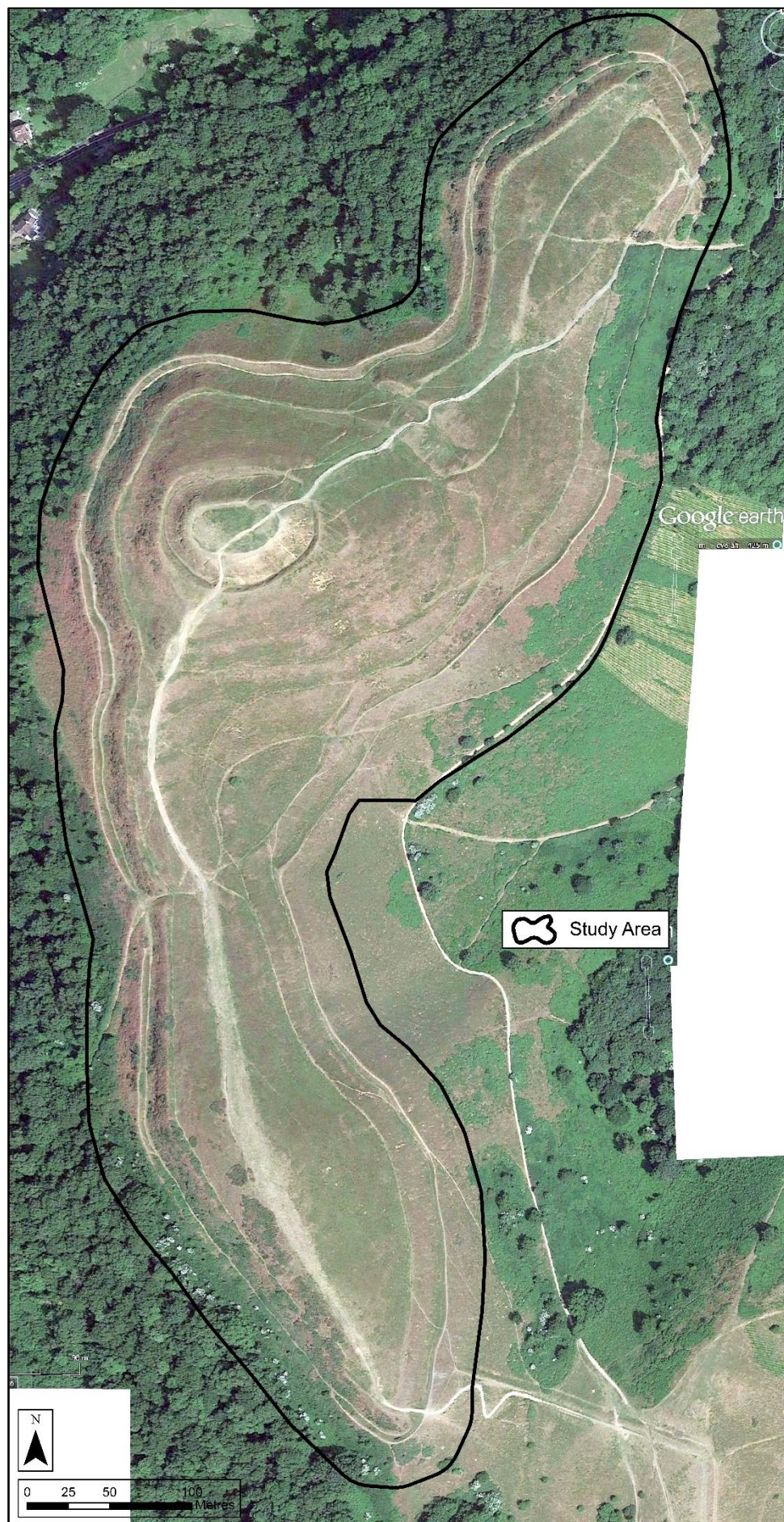


Figure 31: Google Earth image of study area